

**ABSTRACT**

The invention provides semiconductor structures that include a gallium nitride material component and a silicon germanium component, as well as methods of forming 5 such structures. The gallium nitride material component may be a layer formed on a substrate, or may be the substrate itself. Similarly, the silicon germanium component may be a layer formed on a substrate, or may be the substrate itself. Crack formation within the two components can be limited by matching the thermal expansion rates of the gallium nitride material and the silicon germanium and, thus, inhibiting the generation of 10 thermal stresses within the components. The semiconductor structures may be used in a number of microelectronic and optoelectronic applications, amongst others.